Space Weather Forecast

Issued on Wednesday, 11 January 2023 at 12:08 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate solar activity likely. Chance of X-class flares (R3; Strong radio blackouts) throughout. A possible glancing blow from a CME later on the 12th January.

Solar Activity: Solar activity has been High over the past 24 hours, with a Strong flare originating from the numbered sunspot region near the northeast limb. This region continues to grow and become more magnetically complex. There are seven other numbered sunspot regions on the Earth facing disc. The two largest continue to reside in the southeast and southwest quadrants. Another region in the far southeast of the disc has been active, producing several Moderate-class flares, and is showing signs of further development. The remaining spots are all relatively small and have remained largely inactive.

No Earth-directed CMEs have been observed in available imagery in the period.

Solar Wind / Geomagnetic Activity: Solar winds started the period at slow-ambient levels but have drifted erratically above the slightly-elevated level, peak 430km/s. Total Interplanetary Magnetic Field was predominantly weak, while the important north-south alternated between short periods of negative (southward) and positive (northward) but was also weak. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background levels with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be Moderate, with a chance of becoming High from any Strong flares through the forecast period, these most likely from the two largest regions on the disc, or the two regions in the southeast and northeast quadrants.

Solar Wind / Geomagnetic Activity: A Moderate flare from the sunspot region in the southwest generated a CME early on the 9th, which may give a glancing blow at Earth later on day 2 (12 Jan), although this carries a low probability. No other Earth-directed CMEs feature in the forecast.

Solar wind speeds are at slightly-elevated levels, perhaps as a result of weak coronal hole connection. Geomagnetic activity is expected to be Quiet to Unsettled with a slight chance of isolated Active intervals at first. During day 2 (12th Jan) there is the low chance of a glancing blow from the aforementioned 9th Jan CME, which may increase geomagnetic activity, potentially lasting into day 3 (13th Jan), however this is low confidence. Otherwise, geomagnetic activity should remain at generally Quiet levels.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to remain at background levels. However, there is a risk of an increase should

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any significant flares occur, giving a slight chance of exceeding the S1/Minor Storm threshold.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	10	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	80	90	90
Very Active	R3 to R5 X	Yes	25	25	25	25

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	20	20
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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